

Neck Pain

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CERVICAL DISK DISEASE

Neck pain is a common problem encountered by the physician. Ten percent of the adult population has neck pain at any given time. In most cases a careful history and physical examination of the neck can lead to the diagnosis of cervical disk disease. One must differentiate between articular and nonarticular causes, which can be lengthy. Articular structures include synovium, synovial fluid, articular cartilage, intra-articular ligaments, joint capsule, and juxta-articular bone. Nonarticular structures are: supportive extra-articular ligaments, tendons, bursa, muscle, fascia, bone, and skin.

Cervical disk disease can be thought of as two forms: soft-disk and hard-disk disease. Soft-disk disease is an acute herniation of gelatinous nucleus pulposus into or through the annulus of the cervical disk and the absence of previous or more chronic symptoms. Patients tend to be younger and usually have an identifiable event such as trauma.

The second most common form of cervical disk disease is hard disk. Due to mechanical forces over the years, intervertebral disk disease occurs leading to loss of normal production of disk components. This includes loss of annular elasticity, extracellular matrix, desiccation of the nucleus pulposus, and formation of osteophytes. Symptoms of hard disk disease tend to be found in patients 50 years of age and older, insidious in onset, and present with episodic neck stiffness and pain that tend to wax and wane.

Symptoms

- Pain of insidious or acute onset ++++
- Isolated episodic neck stiffness +++
- Waxing and waning pain ++
- Posterior neck pain ++++
- Nerve root pain is usually brief, sharp, and shooting. Pain is increased by coughing, straining, standing or sitting, and head tilting and is usually relieved by lying down with the neck in a neutral position. +++
- Sense of muscular weakness ++
- Nerve root pain proximal and around shoulders; radiates to arms with paresthesias distally +++

Signs

- Pain with neck motion +++++
- Lhermitte's sign (urgent consult) ++
- Disturbances in balance or gait (urgent consult) +
- Lower extremity weakness (urgent consult) ++
- Babinski's sign +
- Hoffman's reflex ++
- Ankle clonus +
- Alterations in bowel/bladder function indicate an urgent consult. +
- Spurling's sign +++
- Specific findings can localize the level of nerve root involvement by deficiencies in motor function.
 - C5 Arm abduction: deltoid and biceps
 - C5, C6, C7 Arm adduction, wrist extensors and abduction, extension of thumb
 - C5, C6, C7 Flexion of elbow, wrist flexors, and finger extensors pronate and supinate forearm
 - C7, C8 Extend elbow, flex and extend fingers, and T1 intrinsic hand muscles
- Biceps and brachioradialis reflex mediated by C5-C6 nerve roots
- Triceps reflex mediated by C6-C7 nerve roots

Workup

- CBC, urinalysis (UA), erythrocyte sedimentation rate (sed rate) (if sed rate is high, look for infectious etiology)
- Complete set of plain films (AP, lateral, oblique, and open-mouth [odontoid]) if indications are as follows:
 - Neck trauma
 - Age older than 50 years
 - Conservative treatment failed
 - All patients presenting with symptoms and signs of radiculopathy
 - Lateral flexion/extension films if previous criteria negative
 - EMG
 - MRI of cervical spine (provides superior delineation of soft-tissue anatomy and is the preferred method for visualizing the intervertebral disk and surrounding structures)

Comments and Treatment Considerations

Treatment includes the following:



PASSIVE MODALITIES

- Rest
 - Immobilization for short-term soft cervical collar
 - Antiinflammatory medication
 - Local modalities (i.e., heat, ice, and massage)
 - Physical therapy (cervical isometrics, restore ROM)

- Active modalities
 - Exercise programs with dynamic and isometric neck strengthening
 - Neck and shoulder stretching
 - Aerobic activities
 - Selective nerve root injections with local anesthetic and epidural
 - Long-acting corticosteroids (under fluoroscopy and technical expertise)
 - Neuropathic pain treatment with TCAs and gabapentin
- Surgical indications
 - Persistent or recurrent radicular pain
 - Progressive or persistent neurologic deficit
 - Cervical myelopathy (usually associated with central disk herniation)

OTHER CAUSES OF NECK PAIN

- Rheumatoid arthritis (gradual onset, symmetric polyarthritis, morning stiffness lasting 1 hour, swelling in three or more joints, distal to proximal involvement, rheumatoid subcutaneous nodules, migratory and intermittent)
- Ankylosing spondylitis (stiffness of spine and sacral areas on first arising in the morning, low back pain, enthesitis, extra-articular involvement such as anterior uveitis)
- Diskitis (fever, chills, diaphoresis, insidiously and progressive over several weeks, painful tender neck, elevated sed rate and CRP, which can exceed 100 mm/hr)
- Herpes zoster (rash and acute neuritis, unilateral radicular symptoms without neurologic findings, rash quickly evolves into vesicles, pain, burning, throbbing, and allodynia)
- Neoplasms (nocturnal awakenings, gnawing, unremitting pain, sensory dysesthesias, muscular weakness, usually unilateral)
- Coronary artery disease (CAD)
- Thoracic outlet syndrome (triad of numbness, weakness, and sensation of swelling of upper limbs, positive Roos sign, Adson's sign, slow and progressive weakness of intrinsic hand muscles and numbness in distribution of ulnar nerve; EMG and chest x-ray may reveal cervical rib)
- Rotator cuff tendinitis and/or tendinopathy (shoulder pain with overhead activity, localized pain to lateral deltoid, night pain and while lying on shoulder, atrophy of supraspinatus and infraspinatus, sunken appearance, asymmetric motion of scapula, pain with more than 90 degrees abduction, pain with internal rotation, painful arc from 60 to 120 degrees, positive Jobe's sign.)
- Carpal tunnel syndrome (pain, paresthesias, and hypoesthesias in the first three fingers and radial half of ring finger, night pain, repetitive shaking of hand returns normal feeling, atrophy of thenar eminence, thumb weakness, positive Tinel and Phalen signs)
- Brachial neuritis (sensory loss, motor dysfunction, and weakness, isolation to single nerve unlikely of plexus origin)

- Polymyalgia rheumatica (aching, morning stiffness lasting 30 minutes, usually symmetric involvement of neck, shoulders, hip girdle, and torso, malaise, fever, fatigue, decreased ROM, weight loss, anorexia, muscle strength normal and muscle tenderness not prominent feature, increased CRP, sed rate)
- Rule out metastatic disease (bone pain, gout, many rheumatologic symptoms; most common causes are lymphomas, leukemias, and paraneoplastic syndrome)
- TMJ syndrome (pain exacerbated by jaw movement; pain in muscles of mastication; nocturnal bruxism; unilateral; pain radiates to jaw, ear, and posterior cervical region; clicking; jaw deviation on opening and closing; pain with anterior forward pressure in external acoustic meatus; malocclusion)

MECHANICAL NECK PAIN

One third of the adult population reports neck pain each year. Multiple etiologies can give rise to neck pain. However, mechanical neck pain is a common problem especially in the young and a common reason for medical consultation. Sporting accidents are second only to motor vehicle accidents as the leading cause of emergency department (ED) visits involving neck injuries. Mechanical neck pain is limited to injuries of the soft tissues such as anterior and posterior longitudinal ligaments, ligamentum flavum, interspinous ligaments, and supraspinous ligaments, considered stabilizing structures. Other stabilizers consist of cervical spine muscles—the sternocleidomastoid, trapezius, strap, and paracervical spine muscles—which can also be involved with mechanical neck pain. Injury to the head such as a blow causes microscopic or gross tensile failure, often where the tendon joins the muscle (myotendinous junction). Whiplash injury is one of the most common mechanical injuries to the neck. Cervical spine capsules, ligaments, and muscle structures can experience microtears as well as occasional complete rupture of ligaments. Sports injuries, primarily in contact sports, lead to mechanical pain and occasionally more serious states. Certain occupations are prone to neck pain because of poor posture and prolonged immobility such as dentistry. Simple awkward neck positions during the nocturnal hours while sleeping can cause neck pain on awakening (torticollis). In addition, emotional and physical stress can be causative agents. Findings of fever, radiculopathy, or Lhermitte's sign (long tract signs), should prompt the examiner to look for more serious etiologies.

Symptoms

- Neck pain at base of cervical spine or upper border of trapezius muscles +++++
- Limited ROM ++++
- Tingling or numbness (paresthesias) limited to the neck and trapezius ++
- Musculoskeletal pain following unaccustomed exercise on arising in the morning +++
- Dizziness +
- Nausea +

Signs

- Possible normal ROM and no tenderness +
- Tactile trigger points +++
- Pain with motion ++++
- Limited ROM ++++
- Normal neurologic examination +++++

Workup

- Immobilization of spine (if concern for more than muscle or ligamentous injury)
- AP, lateral, and obliques of cervical spine including C7-T1 junction
- Flexion and extension views
- CT and MRI of cervical spine (usually not necessary)
- Rest for acute phase then maintain normal activities
- Continue work (if not possible, engage in active exercise program immediately)
- Avoid cervical collar if possible
- Heat and/or ice
- Ultrasound
- Traction of cervical spine
- IV injection of methylprednisolone within 8 hours of injury
- IM lidocaine injection for chronic mechanical neck pain

Comments and Treatment Considerations

Mechanical neck pain usually responds to conservative treatments. With proper rest and care, recovery usually occurs within 1 to 2 weeks. If symptoms are not subsiding, investigate for other significant causes.

MENINGITIS

Annually, 1.2 million cases of meningitis occur, resulting in 135,000 deaths. The serious nature of this disease and its consequences require physicians to be well acquainted with the signs and symptoms. The clinical signs and symptoms occurring at presentation may predict prognosis and early diagnosis may also decrease the number of adverse outcomes. Unfortunately, the symptoms and signs may vary a great deal depending on the age of the patient and other health problems.

Community-acquired meningitis is more likely to occur in higher-risk groups such as those with alcoholism, asplenia, complement deficiency, corticoid excess, HIV, pneumonia, otitis media, diabetes mellitus, and those who are malnourished and unimmunized. Other factors that place patients at increased risk for meningitis include recent travel (sub-Saharan Africa), recent infection, IV drug use, head trauma, and otorrhea or rhinorrhea. The signs and symptoms of meningitis can be nonspecific. However, an accurate history and physical examination can lead to the diagnosis of meningitis. Findings may significantly differ depending on the age of the patient (Table 32-1). Early symptoms and signs of meningitis in the infant

Table 32-1. Meningitis Treatments by Age Group

Preterm to <1 month	Group B streptococci	49%	Ampicillin + cefotaxime <i>or</i>
	<i>Escherichia coli</i>	18%	ampicillin + gentamicin
	<i>Listeria</i>	7%	
	Gram negative	10%	
	Gram positive	10%	
1 month to 50 years	Meningococcus		Streptococcal pneumonia
	<i>Haemophilus influenzae</i>		Cefotaxime <i>or</i> ceftriaxone + Dexamethasone + vancomycin
	<i>Listeria</i> unlikely		
>50 years	<i>Streptococcus pneumoniae</i>	70 %	Ampicillin+ ceftriaxone <i>or</i>
	<i>Listeria</i>	20 %	Cefotaxime + vancomycin +
	Gram-negative bacilli	9 %	IV dexamethasone

may be very subtle; older adults commonly have neck stiffness secondary to cervical disk disease. The most common cause of meningitis is viral followed by bacterial etiologies.

Symptoms

- Neck pain +++
- Fever (95% of patients) +++++
- Myalgia ++
- Nonpulsatile headache +++
- Generalized headache +++++
- Nausea and vomiting ++
- Tachypnea +



ADULT

Signs

- Rash +
- Kernig's +++
- Brudzinski's +++
- Opisthotonos: late sign +++++

- Mental status change (85% of patients) +++
- Seizure +
- Nuchal rigidity (88% of patients) ++++



INFANT

- Irritability +++++
- Poor feeding and poor muscular tone ++++
- Diarrhea +
- Altered sleep pattern +++
- Hypothermia or hypoxia ++
- Paradoxical irritability ++
- Seizure ++
- Jaundice +
- Bulging anterior fontanelle ++
- Opisthotonos: late sign +++++
- Skin or mucous membrane lesions +
- Nuchal rigidity 27% in 0 to 6 months ++

Workup

- CBC with blood cultures
- UA with urine culture
- Chemistry profile
- Lumbar puncture with opening and closing pressures
- Spinal fluid for cell count, Gram stain (Table 32-2), protein, sugar, cryptococcal stain, acid-fast stain, rapid antigen disclosure by latex agglutination culture, and PCRs for viral assessment
- CT indications—Immunocompromised, HIV, immunotherapy, after transplantation, new onset seizure, papilledema, abnormal level of consciousness, focal neurologic deficit

Comments and Treatment Considerations

Further choices of antibiotics are influenced by patient's history of ventriculoperitoneal shunts, post neurosurgery, post head trauma, post cochlear implant, and AIDS. If physical findings of herpes simplex II are found, acyclovir (Zovirax) should be administered.

Meningitis can be a rapidly fulminant and fatal disease. Expedient evaluation and early treatment are imperative to optimize good

Table 32-2. Gram Stain (May Give Direction to Etiology)

Gram-positive + diplococci	Streptococcal pneumonia
Gram-negative diplococci	Meningococcal
Gram-negative small pleomorphic coccobacilli	<i>Haemophilus influenzae</i>
Gram-positive rods and coccobacilli	<i>Listeria</i>

outcomes. If delay in results is anticipated, treatment should be empirically given on the basis of the mostly likely bacterial infection according to age group.

SOFT-TISSUE PAIN DISORDERS

Soft-tissue pain refers to the large number of painful conditions that interfere with mechanical function but are not due to arthritis. There are three subdivisions: local (bursitis, tenosynovitis), regional (myofascial pain syndrome, referred pain), and generalized (fibromyalgia, chronic fatigue, osteomalacia, hypermobility syndrome). This chapter addresses fibromyalgia and myofascial pain syndrome.

Differential diagnoses for soft-tissue pain disorders include:

- Joint disorders: osteoarthritis, loss of joint motion
- Inflammatory disorders: rheumatoid arthritis; polymyositis; polymyalgia rheumatica
- Neurologic disorders: radiculopathy; nerve entrapment
- Regional soft-tissue disorders: bursitis, tendinitis, cumulative trauma
- Diskogenic disorders: degenerative disk disease; annular tears; herniation
- Visceral referred pain: GI, cardiac, pulmonary, renal
- Mechanical stress: scoliosis, leg-length discrepancy
- Metabolic conditions: alcoholic or toxic myopathy; hypothyroidism; deficiency of vitamin B₁, B₁₂, folic acid, calcium, or magnesium
- Infectious diseases: viral illnesses, especially chronic hepatitis
- Psychologic disorders: depression, anxiety, disordered sleep



FIBROMYALGIA SYNDROME

Signs

- Widespread pain of at least 3 months' duration
- Pain on palpation over at least 11 of 18 paired trigger points (above and below the waist) ++++
 - Occiput
 - Cervical (anterior C5-C7)
 - Trapezius (midpoint of upper border)
 - Supraspinatus (upper medial border)
 - Second rib (costochondral junction)
 - Lateral epicondyle
 - Gluteal (upper outer buttock)
 - Greater trochanter
 - Knee (medial condyle)

Symptoms

- Female gender ++++
- Musculoskeletal pain and stiffness in the low back and/or neck (shoulder and pelvic girdle areas)

- General fatigue
- Poor sleep
- Paresthesias (which may mimic nerve root compression)
- Migraine headaches
- IBS
- Restless leg syndrome

Workup

- The pressure applied by the examiner to the trigger point should blanch half of the fingernail bed.
- Neurologic and orthopedic examinations are normal (despite complaints of feeling swollen in the joints). + + + +
- Lab tests are normal and are done to rule out other causes of the pain: CBC, sed rate, chemistry profile, TSH
- Radiologic studies may show incidental osteoarthritis or diskogenic changes.
- Electromyography, nerve conduction studies, and muscle biopsies are normal.
- It is known that people with these pain conditions do not sleep well. However, sleep studies should be ordered only if other problems are suspected such as sleep apnea or restless leg syndrome.

Comments and Treatment Considerations

There is no significant peripheral pathology. However, in the spinal fluid there is increased substance P (which mediates pain transmission) and decreased serotonin (which mediates pain inhibition).

As the pathophysiology has been identified, treatments and medications have been devised to address specific aspects of these syndromes. One mnemonic is ADEPT:

Attitude: The attitudes of the patient, family and coworkers, and health care providers are all important. The patient needs empathy.

Diagnosis: Treat comorbid conditions.

Education: CBT is helpful.

Physical: Low-impact aerobic exercise is beneficial for reducing pain, improving sleep, and balancing mood. Consider starting with walking in place in a swimming pool. As the fear of pain related to exercise decreases, the person will increase activity. The patient needs to balance the amount of exercise and rest.

Treatments: Select medications to treat the primary complaints. Pain responds well to tramadol with acetaminophen; nonsteroidals are not effective. Insomnia has been treated in the past with tricyclics and cyclobenzaprine. Benzodiazepines such as clonazepam reduce anxiety and nocturnal myoclonus (if also present). Two medications that treat both pain and insomnia are pregabalin and gabapentin. These correct the non-rapid-eye movement sleep pattern abnormalities. Duloxetine treats both pain and depression. Fatigue decreases with improved sleep, treatment of comorbid conditions such as depression, and balance between exercise and rest.



MYOFASCIAL PAIN

Signs

- Pain originates from myofascial trigger points in skeletal muscle. ++++
- Trigger points are identifiable by taut bands of muscle that are painful to palpation and cause referred pain in a characteristic pattern.

Symptoms

- Equal male/female distribution ++++
- May begin after a discrete trauma or start insidiously
- Deep aching sensations that fluctuate in intensity
- Each myofascial trigger point has its own characteristic pain pattern.
- Accompanying problems include autonomic dysfunctions (abnormal sweating, vasomotor and temperature changes); neuro-otologic symptoms (dizziness, tinnitus) related to cervical myofascial irritation; and impaired muscle coordination, stiff joints, weakness, paresthesias, and blurred vision.

Workup

- The myofascial trigger point can be identified by gentle palpation across the muscle fibers. ++++
- It is usually accompanied by restricted ROM due to pain from the trigger point. ++++

Comments and Treatment Considerations

These patients have abnormal motor endplates that release excessive amounts of acetylcholine. This results in sustained contraction of the muscle fibers. The local ischemia from chronic contraction stimulates the release of substances that sensitize afferent nerve fibers. In the dorsal horn of the spinal cord these pain signals are referred to adjacent spinal segments. When there is persistent pain, the second-order neurons in the dorsal horn develop a long-lasting increase in excitability of nociceptor pathways.

Trigger-point injections, acupuncture, botulinum toxin injections, and massage therapy are useful. TENS units and ultrasound have yielded mixed results.

References

- Andersen B, Sheon RP: Evaluation of the patient with neck pain. *2006 Up To Date*, Meningitis, Sheldon L. Kaplan, M.D.
- Binder A: *Neck pain*, Stevenage, UK, 2004, BMJ Publishing Group Ltd.
- Borg-Stein J: Treatment of fibromyalgia, myofascial pain, and related disorders, *Phys Med Rehabil Clin North Am* 17:491–510, 2006.
- Aminoff MJ: Mechanical and other lesions of the spine, nerve roots, and spinal cord. In Goldman L, Ausiello D, editors: *Cecil textbook of medicine*, 22nd ed, Philadelphia, 2004, Saunders.

Harrison's on line: *Back and neck pain*, 2005, John W. Engstrom.

Huffman GB: Diagnosis of acute meningitis in adult patients, *Am Fam Physician* 2000.

Medicinal and Injection therapies for mechanical neck disorders (Review) The Cochrane Library 2006, Issue 2

Russell IJ: Fibromyalgia syndrome: approach to management, *Primary Psychiatry* 13:76–84, 2006.

Russell IJ: Fibromyalgia syndrome: presentation, diagnosis, and differential, *Prim Psychiatry* 13:40–45, 2006.

Scherping SC Jr: Cervical disc disease in the athlete, *Clin Sports Med* 21(1): 27–37, 2002.

Smith L: Management of bacterial meningitis: new guidelines from the IDSA, *Am Fam Physician* 71(10):2003–2008, 2005.

The Cochrane Database of Systemic Reviews 2006. Issue 2 Copyright 2006 Exercises for mechanical neck disorders. The Cochrane Collaboration Publishers by John Wiley & Sons.

Young WF: Cervical spondylotic myelopathy: a common cause of spinal dysfunction in older persons, *Am Fam Physician* 62(5):1064–1070, 1073, 2000.

Zepf W: Review of bacterial meningitis in the older patient, *Am Fam Physician* 65(6):1173–1176, 2002.

Zmurko MD, Matthew G, Tony Y, et al: *Cervical sprains, disc herniations, minor fractures, and other cervical injuries in the athlete*, Philadelphia, Saunders.